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PAR 211

1 June 64

SUBJECT: Microdensitometer Study of Effects of Processing

TASK/PROBLEM

1. Collect and study microdensitometric data from mission materials in an attempt to determine the effect of film emulsions, processing, and printing on the characteristics of image edges. Also, attempt to determine true location of image edges for mensuration purposes.

DISCUSSION

2. Acutance Measurements:

a. Based on techniques developed early this quarter an acutance exposing fixture has been built which contains a master sharp edge plate. This edge plate is crossed with a carbon step tablet which serves to attenuate acutance exposures. The film sample is held in contact with the plate by vacuum throughout exposure. The resultant image contains a series of edges having different contrasts.

b. Acutance data is obtained by tracing the series of edges on the [redacted] Model 5 microdensitometer and reducing the output in an I.B.M. 1620 computer. Initial testing using 4404 film has shown results which matched values obtained from the [redacted] which lends confidence to the reliability of our measurement.

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c. Minor modifications were made on the Model 5 Microdensitometer which greatly improved performance of the recorder and reduced experimental error. The most significant feature was to rebuild and panel mount in a relay rack, the electronic circuitry coupling the recorder to the amplifier.

3. Modulation Transfer Measurements: Large amounts of experimental error were noted in the measurement of MTF (modulation transfer function) for 4404 film. The microdensitometer modifications

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that improved acutance measurements did not significantly improve MTF measurements. Further testing by this method will be postponed until a suitable MTF camera becomes available. With better exposures it is believed that MTF can be a useful method for describing image quality effects produced by changes in developer formulation.

4. Developer Chemistry: Panatomic-X Aerial Film, Type 4400 has been exposed and processed in four different developers, two expected to produce high sharpness and two balanced to give low graininess to guide further experiments in developer chemistry.

PLANNED ACTIVITIES

5. During the next quarter film type 4400 will be measured for acutance and granularity along with films 4401 and 4404. Results from this testing should make it possible to characterize the effects of developer chemistry on aerial film edges.